Catalogue no. 11-621-M, no. 92
ISSN 1707-0503
ISBN 978-1-100-23159-4

Analytical Paper

Analysis in Brief

2002-2012: A Decade of Change in Canadian Manufacturing Exports

by Benoît Carrière

Manufacturing and Energy Division
11th Floor, Jean Talon Building, 170 Tunney's Pasture Driveway, Ottawa,
On K1A 0T6

Telephone: 1-800-263-1136

Statistics Canada Statistique Canada

Canada

How to obtain more information

For information about this product or the wide range of services and data available from Statistics Canada, visit our website, *www.statcan.gc.ca*.

You can also contact us by

e-mail at *infostats@statcan.gc.ca*

telephone, from Monday to Friday, 8:30 a.m. to 4:30 p.m., at the following toll-free numbers:

- Statistical Information Service 1-800-263-1136
- National telecommunications device for the hearing impaired 1-800-363-7629
- Fax line 1-877-287-4369

Depository Services Program

- Inquiries line 1-800-635-7943
- Fax line 1-800-565-7757

To access this product

This product, Catalogue no. 11-621-M, is available free in electronic format. To obtain a single issue, visit our website, *www.statcan.gc.ca* and browse by "Key resource" > "Publications."

Standards of service to the public

Statistics Canada is committed to serving its clients in a prompt, reliable and courteous manner. To this end, this agency has developed standards of service that its employees observe. To obtain a copy of these service standards, please contact Statistics Canada toll-free at 1-800-263-1136. The service standards are also published at *www.statcan.gc.ca* under "About us" > "The agency" > "Providing services to Canadians."

Statistics Canada
Manufacturing and Energy Division

2002-2012: A Decade of Change in Canadian Manufacturing Exports

Published by authority of the Minister responsible for Statistics Canada

March 2014

Catalogue no. 11-621-M, no. 92

ISSN 1707-0503
ISBN 978-1-100-23159-4

Frequency: Irregular

Ottawa

Cette publication est également disponible en français.

Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

User information

Symbols

The following standard symbols are used in Statistics Canada publications:

.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0^s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
p	preliminary
r	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
E	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

About this article

Acknowledgement

This study could not have been produced without the contributions made by a number of people. Elton Cryderman, Kacie Ha, Jeff Paul and Michael Schimpf were all actively involved in this project, and all brought invaluable support to the author throughout the writing of the analysis paper.

The author would like to thank André Bernard, Rolland Boudreau, Marie Brodeur, Yvan Clermont, Ziad Ghanem, André Loranger, Michael Scrim and Tom Wilson and his Industry Canada team for their help and constructive suggestions.

The author also gratefully acknowledges the data compilation undertaken by the International Trade Division of Statistics Canada. Finally, the contributions made by the Manufacturing and Energy Division, and more specifically, from colleagues in the Monthly Survey of Manufacturing program, are gratefully acknowledged.

Information to users

The expressions "manufacturing exports", "exports of manufactured goods", "exports of manufactured products", or any other configuration of these terms, are used as synonyms in this analysis paper.

Table of contents

2002-2012: A Decade of Change in Canadian Manufacturing Exports

by Benoît Carrière

1 Introduction

In 2002, Canada exported $396.4 billion worth of merchandise.[1] Slightly less than three-quarters of those exports consisted of Canadian manufactured goods.[2] Between 2002 and 2012, total exports and manufacturers' sales increased, but exports of Canadian manufactured goods declined (Chart 1). Since the data show that this part of the economy underwent major changes during that decade, we think it is important to understand how Canadian manufacturing exports reacted to economic pressures at that time. More specifically, we consider it important to grasp the restructuring effects of the American financial crisis of 2008-2009 on Canadian manufacturing exports. Moreover, in the context of the free trade agreement between Canada and the European Union that was signed in October 2013, an analysis of manufacturing exports to that region can serve as a basis for comparison in evaluating this agreement and its impact on the Canadian manufacturing sector.

Our objective is to analyze the evolution of exports of Canadian manufactured goods between 2002 and 2012. By analyzing trends in the composition of exports and the distribution of foreign importers of Canadian manufactured goods, we will gain a better understanding of how the market for Canadian manufactured goods changed over the last decade. This study seeks to answer the following questions:

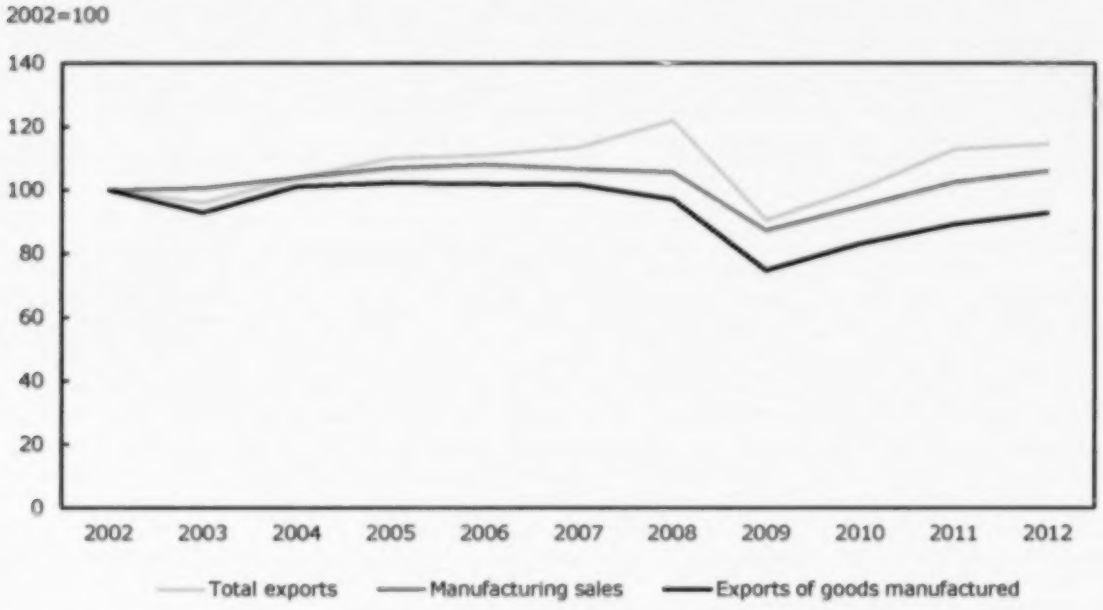
- Considering the different events that characterized the global economy during this period, how did exporting Canadian manufacturers adapt to the new economic reality? Did Canadian manufacturers' trading partners become more diversified?

- Also, how did the changes in exports affect the different manufacturing industries? Did the array of exported manufactured goods change, or did it remain the same?

1 The data on total exports are from Statistics Canada, Merchandise imports and exports, customs and balance of payments basis for all countries, by seasonal adjustment and principal trading areas (CANSIM table 228-0058), annual, at current prices, not seasonally adjusted, 2002.

2 The data on Canadian manufacturing exports were supplied on request by Statistics Canada's International Trade Division. They were produced from a conversion from the Harmonized System to the North American Industry Classification System (NAICS).

Chart 1
Total exports, manufacturers' sales, exports of manufactured goods, indexed



Source: Statistics Canada, International Trade Division, CANSIM table 304-0014, CANSIM table 228-0003.

1.1 Methodology

Statistics Canada customs data on international trade will be used to answer these questions. Although these data sets are coded and released monthly on a "product" basis (Harmonized Commodity Description and Coding System),[3] they can be converted according to "industry" (North American Industry Classification System or NAICS).[4] There are two types of exports: domestic exports and re-exports. Domestic exports include goods grown, extracted or manufactured in Canada (including goods of foreign origin that have been materially transformed in Canada). Re-exports are exports of goods of foreign origin that have not been materially transformed in Canada (including foreign goods withdrawn for export from bonded Customs warehouses).[5]

Since we are focusing on exports from the Canadian manufacturing sector, we will use only data on domestic exports from the manufacturing sector. For example, we will look at domestic exports from the "petroleum and coal product manufacturing" industry (NAICS code 324). These exports differ from "oil and gas extraction" exports (NAICS code 211), since the latter are raw materials from the mining industry that have not undergone enough processing to be classified in the manufacturing sector. Finally, the analysis will be supported by data from other sources, such as manufacturers' sales, the Industrial Product Price Index and American data from the US Census Bureau.

3. The Canadian Export Classificationis a structured, hierarchical classification system based on the Harmonized Description and Coding System. For further information, see "Canadian Export Classification" at *http://www.statcan.gc.ca/pub/65-209-x/2013000/aftertoc-apresdm1-eng.htm*.
4. The North American Industry Classification System (NAICS) was designed by the statistical agencies of Canada, Mexico and the United States to provide common definitions of the industrial structure of the three countries, as well as a common statistical framework to facilitate analysis of the three economies. For more information, see "North American Industry Classification System (NAICS) 2012," available at *http://www.statcan.gc.ca/subjects-sujets/standard-norme/naics-scian/2012/introduction-eng.htm*.
5. Statistics Canada, Definitions, data sources and methods, Canadian international Merchandise Trade (Customs Basis). Available at *http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getDocumentationLink&Item_Id=135508&TItem_Id=879&lang=fr&db=imdb&adm=8&dis=2* (page visited on November 5, 2013).

1.1.1 Methodology limitations

Prior to the analysis, the reader must be aware of certain methodological limitations and implications in regards to the use of conversion. In particular, it is important to note that comparing customs data and sales of manufacturing industries involves a number of methodological complexities. First, part of the value of a domestic manufacturing export may be the result of work by a foreign manufacturer. Thus, manufacturing exports do not necessarily reflect the Canadian value added of the trade. However, the values on manufacturing sales published by the Monthly Survey of Manufacturing (MSM) do not contain any detail in terms of the composition of sales. This aspect would be an interesting topic to explore for the manufacturing sector in future analyses.[6]

In addition, the data on manufacturing exports represent exported products that are manufactured, that is, they have undergone some form of transformation by a domestic manufacturer. However, some wholesalers not included in the MSM's sample for manufacturing sales may process certain products before exporting them. These products will be counted in international trade statistics, but not in statistics on manufacturers' sales.

There are also a number of limitations arising from coding the conversion that creates the link between an exported product and its industry of origin. The codified conversion used in the analysis is based on the 1997 version of the NAICS classification, while the version used today for manufacturing sales is the 2012 NAICS.[7] For this reason, a new conversion was created to compare the data. Details of the conversion are available in Appendix 8 of this paper and the results show similar trends between the two conversions.[8] Based on this exercise, we were able to conclude that using domestic export data converted to the most general industrial level (3 digits NAICS) is a robust way to analyze manufacturing exports.

There may be other minor obstacles. For example, trade data on exported goods may include freight, which is not included in manufacturing sales. Also, it is possible that a manufactured good could be stocked for a period of time before being exported, potentially weakening the relationship between the two variables. However, these limitations are not considered to be significant.[9]

1.1.2 Outline

The paper is organized as follows. Section 2 looks at changes in the destinations of Canadian manufacturing products. Section 3 analyzes the changes in exporting manufacturing industries. We will focus on the industries that underwent the most fluctuations in their exports between 2002 and 2012. Section 4 examines how sales of manufactured goods changed over time with respect to their export intensity ratio. Section 5 concludes the paper with a summary of the research findings. Note that a portion of the data used for this analysis can be found in the appendix.

2 New destinations

From 2002 to 2012, exports of manufactured products decreased more than 7.0%, with a drop of $20.7 billion.[10] This decline was driven by the United States, whose imports of products manufactured in Canada declined by $44.8 billion. Excluding the United States, other countries registered an increase of $24.1 billion. This shows that there were a number of changes in Canadian manufacturers' export destinations during this period.

6. For more information on the composition of exports, see Cross, P., Z. Ghanem. 2008. "Tracking value-added trade: Examining global inputs to exports", *Canadian Economic Observer*, February 2008, Statistics Canada – Catalogue no. 11-010, section 3, page 5.
7. Another conversion using a different classification was used in this paper. For more information, see Appendix 8 of this paper. To find out more about the method and to find out the detailed results, contact the author.
8. For more information on the methodology and results of the new conversion, contact the author.
9. For more information on the methodology limitations, contact the author.
10. Unless otherwise indicated, the data used for manufacturing exports in this study are the sum of monthly data in current dollars, not seasonally adjusted.

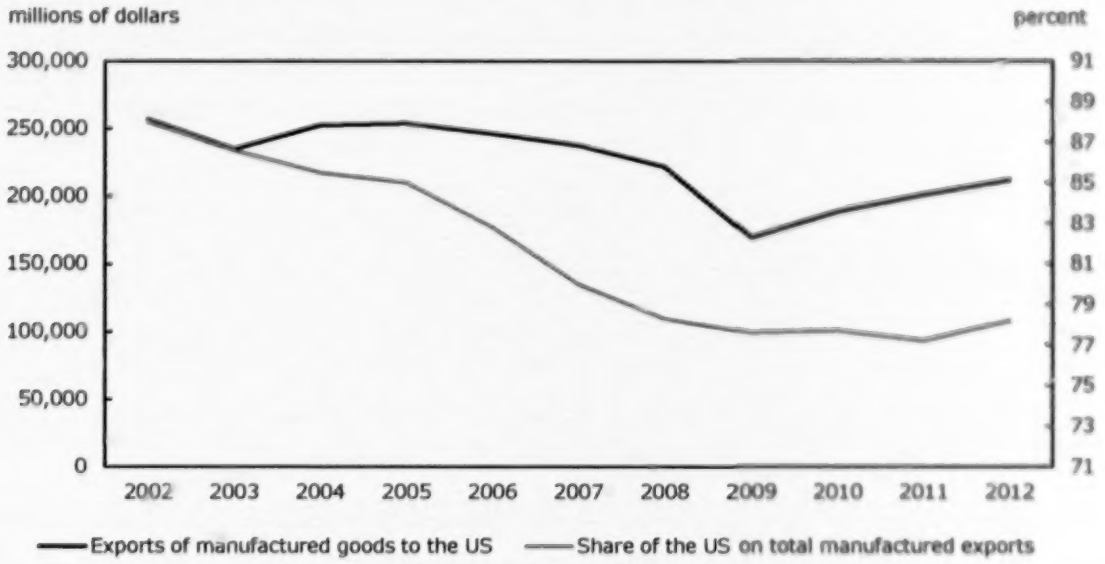
2.1 Decrease in US share

The United States accounted for 78.2% of Canadian manufacturing exports in 2012. Of the 21 industries classified in the manufacturing sector,[11] the United States was the top importing country for each from 2002 to 2012. Furthermore, despite the decrease in exports of Canadian manufactured goods to the United States between 2002 and 2012, those exports in 2012 were substantially higher than in 2009, the year when American imports of Canadian manufactured products were at their lowest level.

The period 2009 to 2012 thus saw the United States make up more than half the losses recorded from 2005 to 2009.[12] However, this turnaround was not enough to bring the American share of Canadian trade in manufactured goods back to its levels before the financial crisis. Indeed, that country's share of total exports of manufactured goods rose by only 0.6 percentage points during the three years of recovery, even though the United States imported $42.6 billion more in 2012 than in 2009, an increase of 25.1%.

The latter statistic shows that the importance of the United States for the Canadian manufacturing sector underwent a transformation during this period, especially during the financial crisis of 2008-2009, when exports of manufactured goods to the United States declined substantially. The subsequent rebound in those exports clearly illustrates this restructuring. For example, from 2006 to 2007, exports of Canadian manufactured products to the United States decreased by $8.7 billion, equivalent to a drop of 2.8 percentage points in that country's share of total manufacturing exports. The first years of the recovery in those exports to the United States paint an entirely different picture. While exports of Canadian manufactured products to the United States made up lost ground, increasing by $12.5 billion from 2010 to 2011, their weight in Canadian manufacturing exports declined by 0.5 percentage points. The widening gap between the US share of total manufacturing exports and the evolution of manufacturing exports to the United States indicates a restructuring of Canadian manufacturing exports (Chart 2).[13]

Chart 2
Manufacturing exports to the United States and US share of total manufacturing exports



Source: Statistics Canada, International Trade Division.

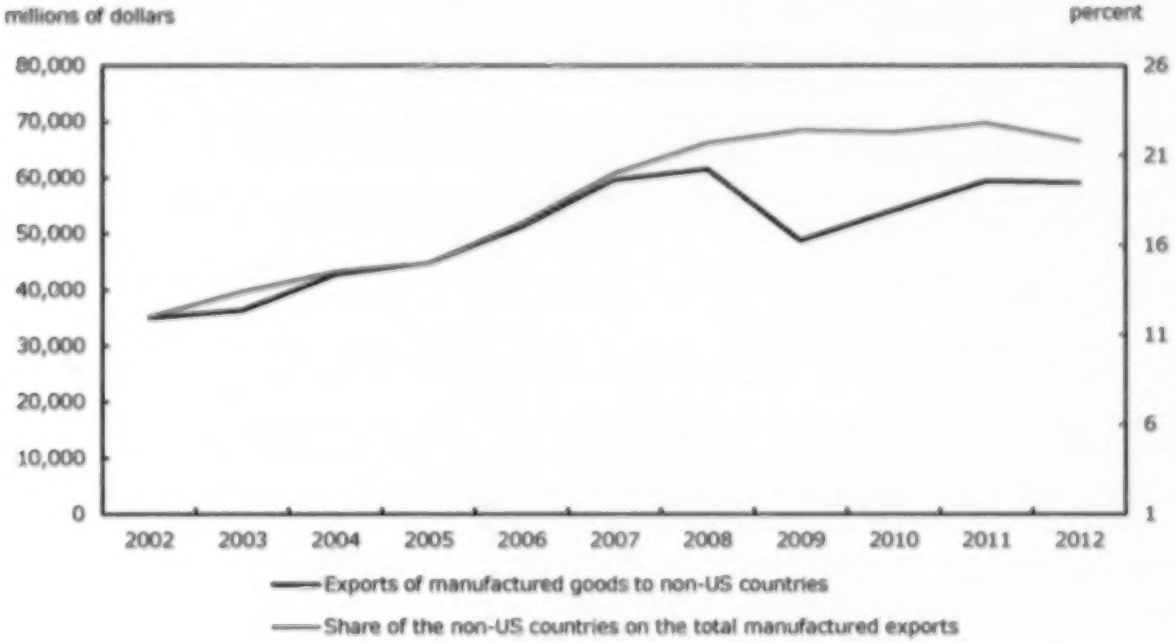
11. North American Industry Classification System (NAICS), 3-digit level.
12. Exports to the United States began declining in 2005, losing $84.5 billion between 2005 and 2009. They rose $42.6 billion from 2009 to 2012.
13. The axes on this chart were set so that the two curves would begin at the same point (2002). When the two curves begin at the same place on the chart, it becomes clear how the trends diverge.

Thus the proportion of exports going to the United States declined and then stabilized, despite the strong growth of those exports at the end of the decade in line with the growth of total Canadian manufacturing exports from 2009 to 2012. This indicates that the recovery of these exports during this period did not only come from our neighbours to the south.

2.1.1 Other countries increase their share

The countries other than the United States necessarily saw their share of Canadian manufacturing exports grow. These countries' share of Canadian manufacturing exports grew by more than 9 percentage points, going from 12.0% in 2002 to 21.8% in 2012. Even though the increase of $24.1 billion coming from those countries was not enough to offset the declines in US exports, these increases in exports to countries other than the United States show an important trend for the Canadian economy. Moreover, 17 of the 20 largest importers other than the United States reported increases between 2002 and 2012. There were few changes from 2002 to 2008 in the relationship between the dollar increase and the share of manufacturing exports going to countries other than the United States, whereas the period 2009-2012 shows a divergence between the two trends, reinforcing the idea that the 2008-2009 economic crisis had a restructuring affect on Canadian manufacturing exports (see Chart 3).[14]

Chart 3
Manufacturing exports to non-US countries and those countries' share of total manufactured exports



Source: Statistics Canada, International trade Division.

14. The axes on this chart were set so that the two curves would begin at the same point (2002). When the two curves begin at the same place on the chart, it becomes clear how the trends diverge.

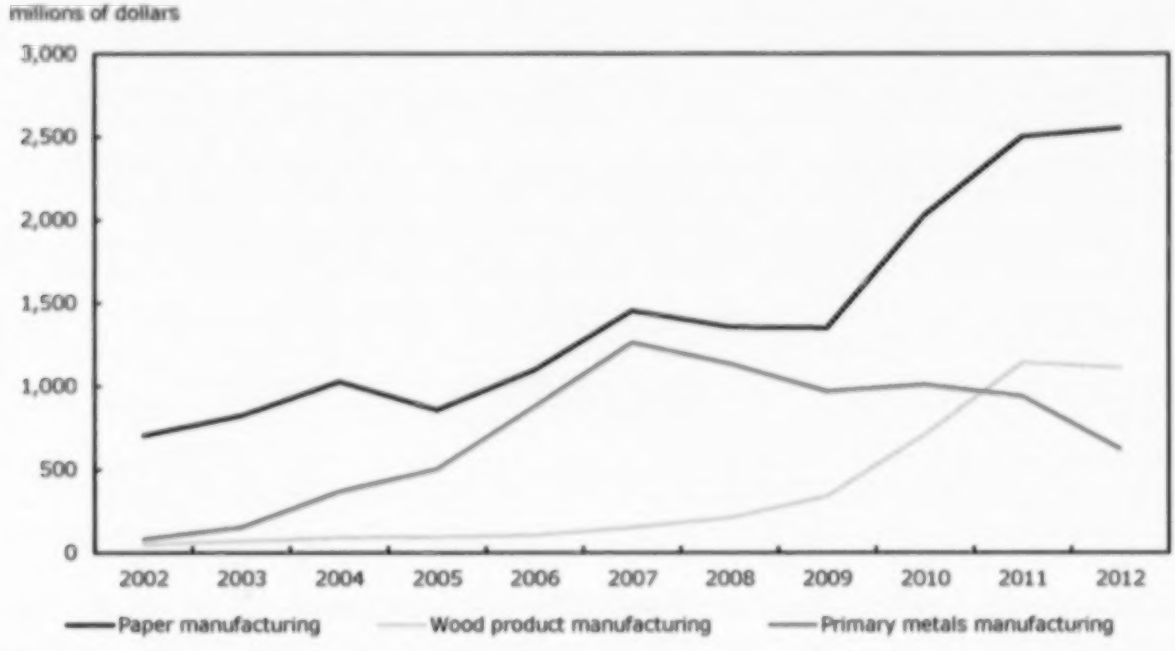
2.1.2 The emergence of China

Among these countries, China had the greatest increase, more than tripling its imports of Canadian manufactured goods. With this increase, its share went from 0.9% to 3.5%, moving China into second place among countries purchasing Canadian manufactured goods. This growth is due to several factors. According to the OECD, the growth in China's GDP between 2004 and 2010 averaged 11.1% per year.[15] During the same period, total Chinese imports more than tripled,[16] with China becoming one of the world's largest goods-importing countries. Since the data show that Canadian producers of manufactured goods are turning increasingly toward China, it is useful to look at the types of Canadian-produced goods that are exported the most to China.

2.1.3 Many Canadian manufactured goods are in demand in China

In 2012, 20 out of 21 industries in the manufacturing sector recorded exports to China exceeding their 2002 levels. While the increase in Chinese demand affected a number of Canadian industries, some stood out.

Chart 4
Canadian manufactured goods exported to China, 2002-2012



Source: Statistics Canada, International Trade Division.

Paper manufacturing was not only the largest Canadian industry that exported to China in both 2002 and 2012, but it was also the one that contributed the most to the increase in exports to that country. Its growth slightly exceeded that of total manufacturing exports to China, growing by 262.2% during the same period.[17] The paper manufacturing market is burgeoning in China, which is of particular interest because this industry underwent one of the steepest declines of any Canadian industry in terms of total exports from 2002 to 2012.[18]

15. Organization for Economic Co-operation and Development, "Country statistical profile: China," 2013, last updated on February 28, 2013. Available at *http://www.oecd-ilibrary.org/economics/country-statistical-profile-china-2013_csp-chn-table-2013-1-en* (visited on July 11, 2013). Data for China were available only from 2004 to 2011.
16. *Ibid.* $561.2 billion (US) in 2004 and $1,743.4 billion in 2011.
17. From 2002 to 2012, manufacturing exports to China grew by 241.9%.
18. During this period, the paper manufacturing industry saw its exports decline by $8.4 billion, or 35.5% of its value in 2002.

The strong Chinese demand is due to several factors. First, high rates of economic growth have major social impacts, such as an increase in the standard of living and the literacy rate. But above all, China has become a major paper producer in recent years, and it now has the largest paper mills in the world.

However, wood costs in China are also among the highest, which means that Chinese producers must look overseas for their supply of pulp and paper[19] to make their production viable. The increase in these costs is partly attributable to Russia, China's main supplier of wood, which in 2008 introduced a tax on exports of wood products. Russia's market also experienced sizable increases in operating costs over the past ten years, becoming less competitive in the European, Chinese and Japanese markets.[20]

The wood products manufacturing industry exported 21 times more to China in 2012 than in 2002. It is interesting to note that of all manufacturing industries and for all importing countries combined, this industry registered the second largest drop in its exports, after transportation equipment manufacturing.[21] This increase was due to a strong real estate market that was also boosted by low interest rates and increased lending on the part of Chinese banks.[22] A strong real estate market, combined with the fact that the Russian wood products manufacturing industry was hit by sizable increases in production costs during the past 10 years, made Canadian wood products more attractive for China.[23]

Also contributing to this rise was the primary metal manufacturing industry. This Canadian industry exported almost eight times more to China in 2012 than in 2002. The factor that contributed the most to this increase is related to China's economic growth. In this case, domestic production was unable to keep pace with demand. Even though China has many metal resources and numerous processing plants, steel production in China was unable to keep up with domestic demand, thus creating a demand for imports.[24] As a result, from 2002 to 2012, China went from being an exporter to being an importer of primary metal products, helping that industry in Canada to become the country's second-ranking exporter of manufactured goods.

To conclude, several other industries saw their exports to China grow substantially. One of these was the food manufacturing industry, where its exports increased by more than six-fold during the 2002-2012 period, whose products ranked second among Canadian manufactured goods most in demand in China. Meanwhile, the petroleum and coal product manufacturing industry, even though it ranked only ninth in 2012, exported almost 40 times more to China in 2012 than in 2002.

2.1.4 More Canadian manufactured goods went to European Union member countries

The member countries of the European Union (EU)[25] also contributed to the diversification of Canadian manufacturers' trading partners. EU member countries imported nearly $5 billion more of Canadian manufactured goods in 2012 than in 2002, the second largest increase after China, causing their share of exports of Canadian manufactured goods to go from 4.5% to 6.5%.

19. Schafer, K., ed. 2012. "2012 The China Pulp Market: A Comprehensive Analysis and Outlook," Resource Information Systems Inc. Boston, Massachusetts. Press Release, *available at http://www.risiinfo.com/pages/abo/news/latest/China-wood-pulp-production-to-continue-at-aggressive-pace-but-market-pulp-business-unsustainable-over-time.html*, (site visited on July 26, 2013).
20. Taylor, R., G. Van Leeuwen. 2013. "Russia: Forest industry competitiveness & export outlook,"*International Wood Markets Group*, Third Edition, July 2013.
21. In terms of exports, the wood manufacturing industry lost $9 billion, or 49% of its value in 2002, during this period.
22. These monetary policies were introduced in 2003 by Wen Jiabao and gave access to affordable credit for the construction and purchase of new homes, thus stimulating the Chinese real estate market.
23. See Taylor and Van Leeuwen.
24. Francis, M. 2007. "The Effect of China on Global Prices". *Bank of Canada Review* (Autumn): p.19-21.
25. The European Union had 27 member countries in 2012. Since Croatia, the 28th country to join the EU, became a member in 2013, the data from that country are excluded from our analysis of EU member countries.

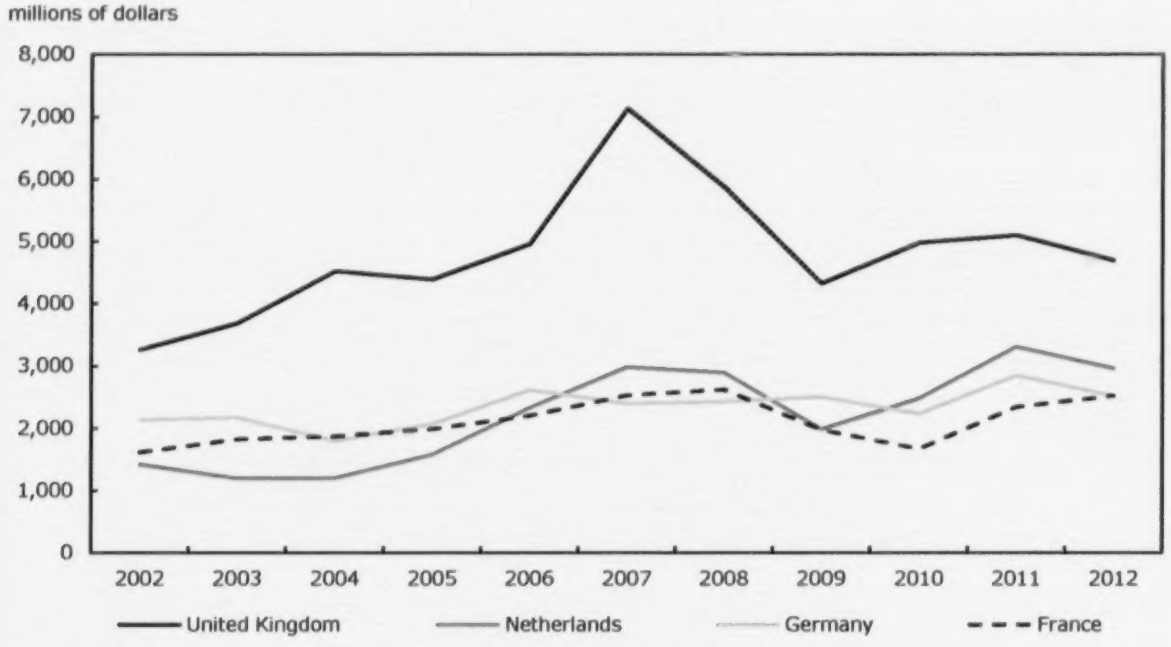
2.1.5 British partner and the Dutch cure

The EU member country that imported the most Canadian manufactured goods from 2002 to 2012 was the United Kingdom. Indeed, more than one-quarter of Canadian exports of manufactured goods to the EU went to the United Kingdom.[26] Despite sizable declines in 2008 and 2009, the United Kingdom recorded an increase of $1.4 billion from 2002 to 2012. More than two-thirds of that increase was attributable to imports of Canadian primary metal products.

The Netherlands showed the strongest growth of EU member countries, with an increase of $1.5 billion in its imports of Canadian manufactured products between 2002 and 2012. With this increase, the Netherlands emerged as the second largest purchaser among EU countries of Canadian manufactured products and the sixth overall.[27] This rise was driven by petroleum and coal products, which generated nearly the two-thirds of the increase.

France also revealed sizable growth, with an increase of $908.8 million, representing 56.4% of its 2002 value. Germany reported a more modest increase of $388.7 billion, representing 18.2% of its 2002 value.

Chart 5
Exports of Canadian manufactured goods to EU member countries, 2002-2012



Source: Statistics Canada, International Trade Division.

26. The United Kingdom accounted for 26.5% of exports of Canadian manufactured goods going to the EU in 2012. The proportion was 25% in 2002 and 32.7% in 2007.
27. The Netherlands was the second-ranking EU country in 2007, 2008, 2010, 2011 and 2012.

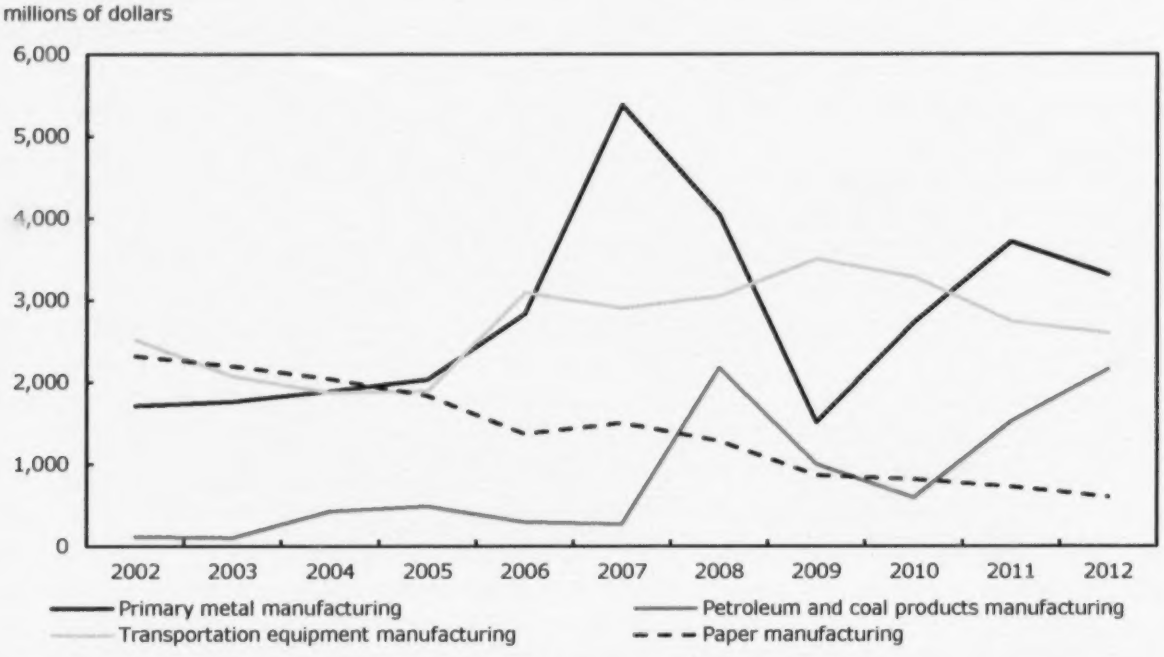
2.1.6 Metals, petroleum and aircraft

The United Kingdom and the Netherlands combined accounted for more than 63% of the increase in Canadian manufacturing exports to the EU, with the petroleum and coal product manufacturing industry driving the Dutch increases, and the primary metal manufacturing industry driving the British increases. These same two industries were responsible for more than three-quarters of the increase in Canadian manufacturing exports to EU member countries between 2002 and 2012.

Also, the second-ranking Canadian industry for exports to EU countries in 2012 was transportation equipment manufacturing. With an increase of only 3.2% between 2002 and 2012, this industry has been one of the most stable with respect to Canadian manufacturing exports to these countries since 2006. France, the United Kingdom and Germany were the three biggest EU destinations for products from the transportation equipment industry. For these three countries, the aerospace products and parts sub-industry largely predominates. In fact, aerospace product and parts manufacturing accounted for more than 85% of transportation equipment exports to EU countries, both in 2012 and in 2002.

A final point is that decreases for paper manufacturing products substantially reduced Canadian manufacturing exports to EU member countries. Indeed, 2012 levels were barely more than one-quarter of those in 2002. The relative increase in manufacturing exports to the EU was 36.2% in 2012, but excluding the decrease attributable to paper manufacturing, that increase would have been 60.1%.

Chart 6
Canadian manufactured goods exported to EU member countries, 2002-2012



Source: Statistics Canada, International Trade Division.

2.1.7 New markets for Canadian manufactured goods

How then did Canadian export manufacturers adapt to the new economic reality during these years? The American financial crisis of 2008-2009 generated a major change in the structure of Canadian exports. Even though the United States is still Canadian manufacturers' main partner, a smaller share of their exports goes to US markets. An examination of Canadian exports of manufactured goods to the United States and that country's share of that sector's total exports reveals an increase in the importance of other countries for Canadian manufacturing companies. This is not to say that Canadian manufacturers consider the American market less important, but that they developed new markets for their products during this period.

3 An economy based on new export industries?

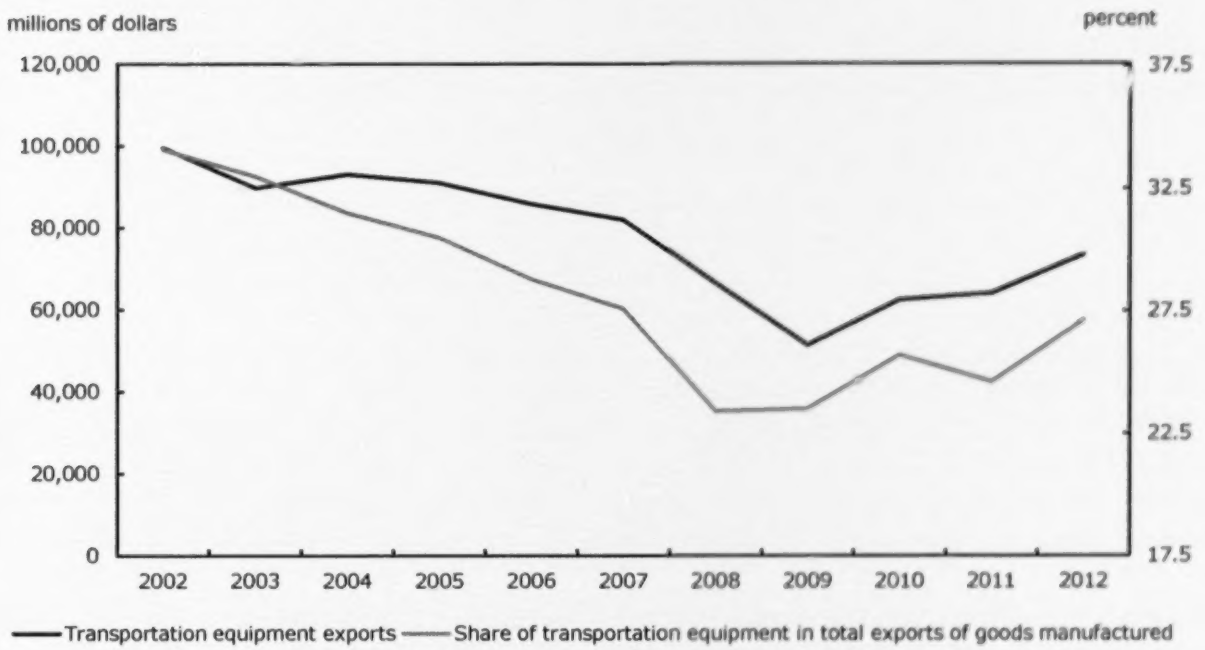
Of the 21 industries in the manufacturing sector, 15 recorded decreases in exports from 2002 to 2012.[28] The largest decrease was for the transportation equipment manufacturing industry. The latter has long been, and continues to be, the leading Canadian manufacturing industry in terms of sales and exports.[29] However, between 2002 and 2012, transportation equipment exports fell by $26.1 billion, representing a decrease of 7 percentage points in its share of total manufacturing exports. Excluding the transportation equipment industry, manufacturing exports grew by $5.4 billion between 2002 and 2012.

3.1 The heart of the Canadian manufacturing sector: transportation equipment

Despite the sizable decrease in exports from this industry, it was by far the leading exporter in the manufacturing sector in 2012, with 27.1% of total exports of manufactured goods. For comparison purposes, the second-ranking export industry, primary metal manufacturing, accounted for little more than one-tenth of total manufacturing exports that same year. Also, despite the decrease since 2002, the 2012 levels were substantially higher than those in 2009 for the transportation equipment industry. Thus, from 2002 to 2009, this industry's exports contracted by $48.2 billion and its share of total manufacturing exports declined 10.6 percentage points. From 2009 to 2012, transportation equipment exports rebounded by $22.1 billion, while this industry's share of the manufacturing sector's total exports improved by only 3.6 percentage points. Chart 7 illustrates this industry's reduced share of manufacturing exports. If the weight of this industry had remained constant between 2002 and 2012, the two trends would have evolved along similar lines.[30] This situation shows how the exports of the manufacturing sector have diversified, similar to the diversification noted with respect to the countries importing Canadian manufactured goods.

28. These 15 industries accounted for approximately 51.5% of the exports of the manufacturing sector in 2012.
29. Transportation equipment sales accounted for 22.6% of total manufacturers' sales in 2002, whereas this proportion was 17.5% in 2012. This industry accounted for 34.1% of manufacturing exports in 2002, while the corresponding proportion was 27.1% in 2012.
30. The axes on this chart were set so that the two curves would begin at the same point (2002). When the two curves begin at the same place on the chart, it becomes clear how the trends diverge.

Chart 7
Exports of transportation equipment and their share of total manufacturing exports



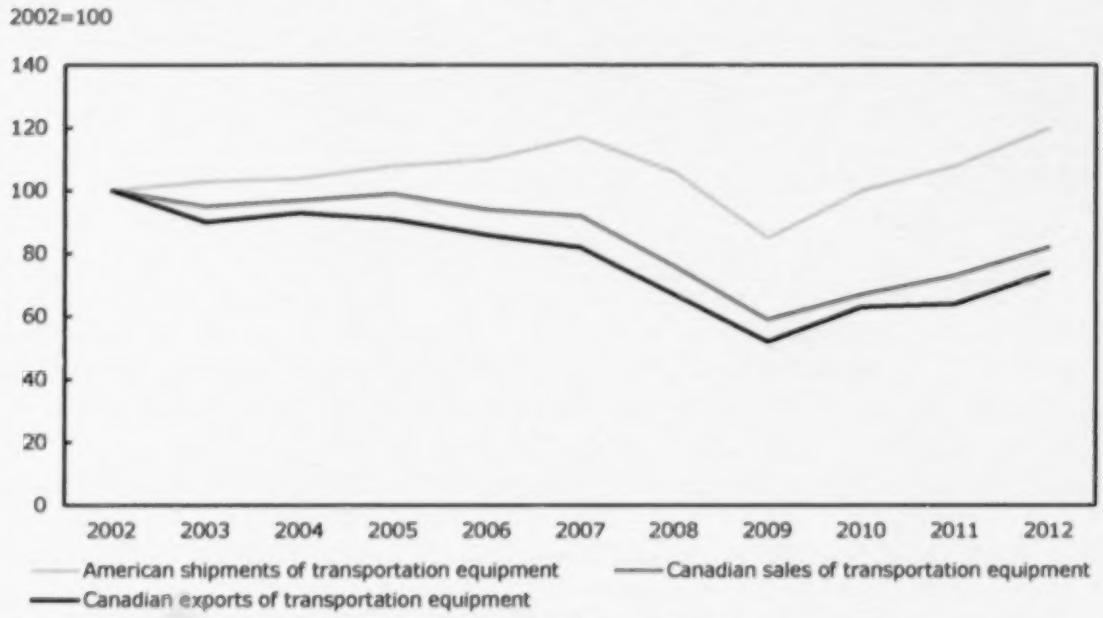
Source: Statistics Canada, International Trade Division.

3.1.1 American and Canadian trends differ

Since more than 90% of transportation equipment exports go to the United States,[31] it is clear that much of the explanation for the decline in this industry's exports lies with our neighbours to the south. First, unlike in Canada, the United States sold more transportation equipment in 2012 than in 2002.[32] Whereas American shipments[33] were 20.0% higher in 2012 than in 2002, the sales of Canadian manufacturers fell 17.7%. Since the economic turnaround that began in 2009, Canadian sales of transportation equipment have pursued an upward trend, closely following American shipments. While Canada sold 40.0% more transportation equipment in 2012 than in 2009, the United States sold 41.5% more during the same period. The reason why Canada did not return to its 2002 sales levels is to be found in the pre-recession period 2002-2007.[34] While shipments rose 17.2% in the United States during this period, those in Canada declined 7.8%. This industry's exports and sales pursued the same trend from 2009 to 2012, but exports reported greater losses between 2002 and 2007 with a decline of 17.6%.

31. Namely, 94.9% in 2002 and 90.5% in 2012.
32. The data on Canadian sales come from Statistics Canada, Stocks, Manufacturers' sales, inventories, orders and inventory to sales ratios(CANSIM table 304-0014). American shipments: US Census Bureau.
33. Manufacturers' sales in the United States are called "shipments" by the US Census Bureau.
34. The 2007-2009 period is very similar for the Canadian and American transportation equipment industries because of the 2008-2009 recession.

Chart 8
Transportation equipment: American shipments, Canadian sales and Canadian exports, indexed, 2002=2012



Source: Statistics Canada, International trade division; US Census Bureau.

3.1.2 Vehicle exports and American demand: a different trend

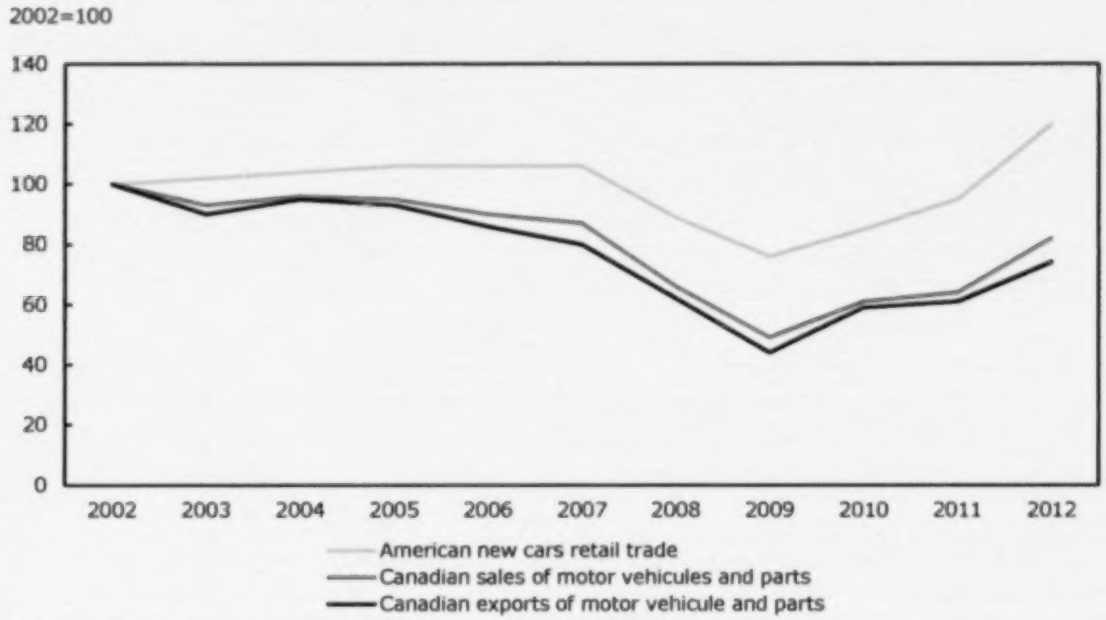
In its exports, the transportation equipment industry is largely dominated by two sub-industries: motor vehicle manufacturing and motor vehicle parts manufacturing.[35] Also, more than 97% of exports from these two sub-industries went to the United States in 2012.[36]

The fact that a substantial portion of these sub-industries' sales goes to the United States shows that Canadian production of motor vehicles and parts is largely tied to American demand for motor vehicles. An indicator of American motor vehicle demand is the variation in the new vehicle retail trade. This trade has increased significantly since 2009 in the United States, and as in the case of American shipments, the period 2002 to 2007 was also positive for new vehicle retail trade in the United States. Also, the 2012 levels exceeded those of 2002, which is not the case for the Canadian manufacturing and export levels for these two sub-industries.

In summary, the evolution of Canadian exports of vehicles and parts and American demand for new vehicles exhibited different trends from 2002 to 2007, even though these Canadian sub-industries depend on American demand. The variation in transportation equipment exports was similar to that of American demand from 2009 to 2012, but not from 2002 to 2007, which explains why, in 2012, the Canadian transportation equipment manufacturing sector had still not regained the levels it registered in 2002.

35. For simplicity, these two sub-industries will be jointly referred to here as "motor vehicle and parts manufacturing."
36. Together, the sales of the motor vehicle manufacturing and motor vehicle parts manufacturing sub-industries accounted for 81.4% of transportation equipment sales in Canada in 2002. The corresponding proportion was 75.9% in 2012. Also, 98.5% of the sales in these two sub-industries went to the United States in 2002, whereas 97.6% did so in 2012.

Chart 9
Canadian sales and exports of motor vehicle and parts, and American new cars retail trade



Source: Statistics Canada, International trade division; US Census Bureau.

3.1.3 Export growth in four industries

While most industries revealed declines in their exports, some showed sufficient growth to offset a significant share of the losses registered by the transportation equipment manufacturing industry from 2002 to 2012. In fact, if that industry were excluded, exports from manufacturing industries would have increased by 2.8%. Thus, even though 14 of the other 20 industries (excluding transportation equipment) posted decreases, a few industries had large enough gains to partially offset the decreased exports in the manufacturing sector. However, some of these industries also posted sizable price increases during this period.

3.1.4 Primary metals

The increase in its exports from 2002 to 2012 made the primary metal manufacturing industry the second largest exporter in the manufacturing sector after the transportation equipment manufacturing industry. It had ranked fourth in 2002. Primary metal manufacturing products registered a significant increase with exports being $9.5 billion higher in 2012 than in 2002. In relative terms, exports of primary metal products were up more than 4 percentage points in 2012 compared with 2002, going from 6.7% of total manufacturing exports to 10.7%.

The increase in this industry's exports is almost entirely due to higher prices, with the industrial price index for primary metal manufacturing products increasing 48.1%[37] and exports in current dollars increasing 49.0% from 2002 to 2012. While more than 80.2% of these exports went to the United States in 2002, only 69.6% did so in 2012.

37. The industry price index data are from Statistics Canada, Industry Price Indexes, by North American Industry Classification System (NAICS) (CANSIM table 329-0057). We use the annual average for each year.

3.1.5 Chemicals

Exports of the chemical manufacturing industry exhibited a trend very similar to that of primary metal manufacturing, growing by $8.8 billion between 2002 and 2012. With this increase, the industry became the third largest exporter of all manufacturing industries, whereas it had ranked fifth in 2002. Proportionally, the chemical industry accounted for 10.4% of all manufacturing exports in 2012, compared with 6.7% in 2002.

This growth of exports was also accompanied by price increases. The industry exports grew 45.1% while the price index for this industry grew 39.7%[38] between 2002 and 2012. Also, the share of chemical exports going to the United States declined during this period. Whereas nearly 85% of exports went to that country in 2002, the proportion did not exceed 77% in 2012.

3.1.6 Petroleum and coal products

Exports of the petroleum and coal product manufacturing industry generated the greatest dollar increase in the Canadian manufacturing sector, registering nearly $15 billion more in 2012 than in 2002. The exports of this industry also grew proportionally, almost tripling their share of total exports of the Canadian manufacturing sector. Whereas this was the tenth-ranking export industry in Canada in 2002, it ranked fourth in 2012.

Similar to the chemical and primary metals industry, the variation in exports from the petroleum and coal industry was largely a result of an increase in this industry's prices. Although exports rose 164% in dollar terms, prices increased by more than 132%.[39] Even though there was a slight increase in volumes, rising prices were largely responsible for this industry's emergence as one of the largest exporters in the manufacturing sector. And finally, as in the chemicals and primary metals industies, a smaller proportion of petroleum and coal product exports went to the United States in 2012. Whereas almost all (97.5%) of these exports went to that country in 2002, the proportion was only 86.6% in 2012.

3.1.7 Food

Food manufacturing was also one of those industries showing an increase in their exports, with a rise of more than 38% in 2012 compared with 2002. With this increase, the industry became the fifth largest exporter in the manufacturing sector during the 2002-2012 period,[40] with its share of total manufacturing exports going from 5.7% to 8.6%.

The price index for this industry grew moderately compared with the previously mentioned industries. Compared with the 2002 reference year, the prices of this industry's products rose 18.9% and exports in dollar terms rose 38.7%. Consequently, both prices and volumes pushed up food manufacturing exports between 2002 and 2012. In 2002, nearly three-quarters of this industry's exports went to the United States, while less than two-thirds did so in 2012.

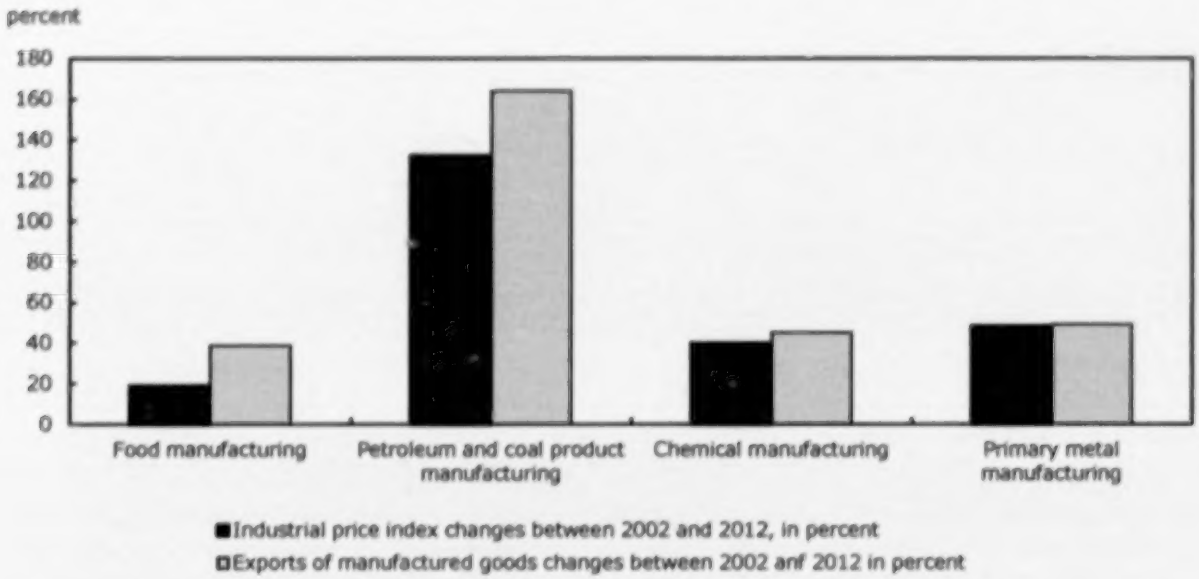
3.1.8 Manufacturing sector exports are more diversified

In summary, Canadian exports from these four industries partially offset the dollar losses registered by the transportation equipment manufacturing industry. In 2012, these industries combined accounted for 38.6% of exports of Canadian manufactured goods, whereas they accounted for only 22.2% in 2002. During this period, the transportation equipment industry's share went from 34.1% to 27.1%. Even though the increases posted by these four industries were not sufficient, manufacturing exports were less based on the transportation equipment sector in 2012, and several other industries gained ground, making manufacturing a more diversified sector. In 2002, apart from the transportation equipment manufacturing sector, there was only one industry whose share of manufacturing exports exceeded 8%, whereas there were four in 2012.

38. *Ibid.*
39. *Ibid.*
40. It ranked seventh in 2002.

Lastly, the increases in these industries were all characterized by a decrease in the proportion of exports going to the United States. Even though in all cases, that country led the increase in dollar terms, its proportional share declined substantially for each of the four industries mentioned above.

Chart 10
Changes in prices and in exports



Source: Statistics Canada, International trade division; CANSIM table 329-0057 for the prices index.

4 Export intensity of Canadians industries

Export intensity is the ratio of exports from the manufacturing sector to manufacturers' sales. The export intensity ratio serves to identify the portion of sales going to foreign markets and the portion going to domestic markets. For example, while the food manufacturing industry posted significant increases in its exports between 2002 and 2012 (Table 1), they paralleled the increase in that industry's sales. Thus, despite an increase in this industry's exports, practically the same proportion of sales went to export markets. The same is true for the petroleum and coal product industry, whose intensity remained relatively stable despite a sizable increase in its exports.

Table 1
Manufacturing exports and export intensity ratio, by industry, 2002-2012

Industries	Exports of manufactured goods 2002	Intensity of exports in 2002	Exports of goods manufactured goods 2012	Intensity of exports in 2012	Change in percentage points
Food	16,787	26.2	23,287	26.7	0.5
Beverage and Tobacco Product	1,532	12.7	999	8.6	-4.1
Textile Mills	1,707	40.1	800	50.1	10.1
Textile Product Mills	858	29.1	417	23.8	-5.2
Clothing	2,938	36.6	858	33.9	-2.7
Leather and Allied Product	281	26.9	184	44.9	18.1
Wood Product	18,329	55.9	9,346	46.9	-9.9
Paper	23,762	69.3	15,331	63.5	-5.8
Printing and Related Support Activities	1,987	16.3	985	9.5	-6.8
Petroleum and Coal Products	9,140	27.1	24,132	28.3	1.2
Chemical	19,483	48.1	28,262	61.5	13.4
Plastics and Rubber Products	12,088	47.8	10,453	42.6	-5.2
Non-Metallic Mineral Product	2,859	24.5	1,714	13.0	-11.6
Primary Metal	19,496	54.0	29,047	62.7	8.7
Fabricated Metal Product	8,397	26.1	6,608	18.9	-7.2
Machinery	20,388	74.3	22,870	64.9	-9.4
Computer and Electronic Product	16,075	71.8	10,044	73.5	2.6
Electrical Equipment, Appliance and Component	6,015	59.3	5,122	49.5	-9.9
Transportation Equipment	99,513	78.7	73,424	70.6	-8.1
Furniture and Related Product	7,269	52.2	3,449	33.6	-18.6
Miscellaneous	3,105	37.2	4,048	35.8	-1.3
Total	291,969	52.1	271,259	45.7	-6.5

Note(s): These data in this table have been rounded.

From 2002 to 2012, 14 industries of 21 saw their export intensity decline. In all, this ratio fell 6.5 percentage points. Furthermore, while most sales of manufacturers were to foreign buyers in 2002 (export intensity above 50%), a majority of those sales were to Canadian buyers in 2012 (export intensity below 50%). Of the industries that had the highest export levels in 2002, the industries that manufactured wood products, machines and transportation equipment greatly contributed to the change in the composition of manufacturers' sales, with sizable decreases in their export intensity. Chemical manufacturing and primary metal manufacturing were the industries that had the increases that compensated the most losses registered by the previous industries.

5 Conclusion

This paper provides a new perspective on Canadian exports. Since a majority of these exports are manufactured goods, it was necessary to analyze the changes in the structure of exports of manufactured goods to understand how the merchandise trade and the manufacturing sector evolved in the past decade. This period was characterized by several economic events, and the study sought to understand how industry adjusted during it.

Three key changes in the export of Canadian manufacturing goods were identified. First, the share of manufactured goods exported to countries other than the United States has increased. Second, the share of the transportation equipment manufacturing industry has diminished, giving rise to other exporting manufacturing industries. Finally, Canadian consumption of manufactured goods has gained importance for manufacturers compared to foreign buyers over the period studied.

As a result of these key changes, even though manufacturing export levels in 2012 have not recovered to 2002 levels, this sector of the economy has restructured in order to benefit more from markets beyond the United States and to export a greater variety of manufactured goods.

Despite the steep drop in manufacturing exports in 2009, much ground was regained from 2010 to 2012. The United States contributed to this recovery, but that country's share of Canada's total manufacturing exports did not follow the upward trend in dollar terms from 2010 to 2012. This relative decline was accompanied by an increase in other countries' share. China in particular, owing to its economic growth, the strength of its real estate market and high costs for pulpwood, was the country showing the greatest increase in its imports of Canadian manufactured goods during this period.

Exports from the transportation equipment manufacturing industry led the declines in manufacturing exports during this period. Dominated by the motor vehicle and motor vehicle parts manufacturing sub-industries, transportation equipment exports had not regained their 2002 level by 2012. This was in contrast to the American demand for new vehicles, which trended upward from 2002 to 2007, a period when sales and exports of Canadian manufacturers in this industry were declining. Despite a major rebound from 2010 to 2012, this industry also lost ground, with other Canadian industries posting sizable increases in their exports during the study period.

Some industries, then, partly offset the losses recorded in transportation equipment manufacturing. In 2012, the primary metal, chemical, petroleum and coal product and food manufacturing industries registered combined higher levels of exports than the transportation equipment manufacturing industry, which was not at all the case in 2002. Prices strongly influenced the showing of these industries from 2002 to 2012.

The data lent themselves to other conclusions. We found that foreign markets no longer account for a majority of manufacturers' sales, with export intensity now below 50%. Despite strong dollar increases, the food manufacturing and petroleum and coal manufacturing industries posted relatively stable export intensity ratios. The wood product, machinery and transportation equipment manufacturing industries saw their export intensity decline. By contrast, both chemical and primary metal manufacturing posted sizable increases in export intensity.

6 Bibliography

Francis, M. 2007. "The Effect of China on Global Prices. "*Bank of Canada Review* Autumn 2007: 13-25.

Organization for Economic Co-operation and Development. *Country statistical profile: China*. Last updated February 28, 2013. Available at: *http://www.oecd-ilibrary.org/economics/country-statistical-profile-china-2013_csp-chn-table-2013-1-en* (accessed July 11, 2013).

Schafer, K., 2012. "2012 The China Pulp Market: A Comprehensive Analysis and Outlook" (Press release). September 21. Boston, Massachusetts: Resource Information Systems Inc. (accessed July 26, 2013).

Statistics Canada. *Data quality, concepts and methodology: Technical notes – The Canadian International Merchandise Trade Statistical program*. Last updated June 3 2013. Available at *http://www23.statcan.gc.ca/imdb-bmdi/document/2201_D9_T9_V1-eng.htm* (accessed November 5, 2013).

Statistics Canada. *Table 228-0058 Merchandise imports and exports, customs and balance of payments basis for all countries, by seasonal adjustment and principal trading areas, monthly* (table). CANSIM (database). Last Updated November 28, 2013. Available at; *http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2280058&paSer=&pattern=&stByVal=1&p1=1&p2=49&tabMode=dataTable&csid=#F1* (accessed June 13, 2013).

Statistics Canada *Table 304-0014 Manufacturers' sales, inventories, orders and inventory to sales ratios, by North American Industry Classification System (NAICS), Canada, monthly* (table). CANSIM (database). Last Updated December 10, 2013. Available at; *http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3040014&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid* (accessed July 31, 2013).

Statistics Canada. *Table 329-0057 Industry price indexes, by North American Industry Classification System (NAICS), monthly*. CANSIM (database). Last Updated November 27, 2013. Available at; *http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3290057&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid* (accessed September 25, 2013).

Taylor, R., G. Van Leeuwen. 2013. "Russia: Forest industry competitiveness & export outlook" (Press release). July 2013. Vancouver, Canada: International Wood Markets Group (accessed August 1, 2013).

Appendix I — Appendices

Text table 1

Exports of manufactured goods by industry, 2002-2012 (millions of dollars)

Industries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Food Manufacturing	16,787	16,532	16,134	17,694	16,771	17,150	19,389	19,307	19,641	20,101	20,267
Beverage and Tobacco Product Manufacturing	1,032	1,449	1,386	1,177	1,265	1,165	886	869	868	910	889
Textile Mills	1,707	1,609	1,516	1,382	1,197	1,080	840	765	779	752	693
Textile Product Mills	808	734	765	737	688	686	530	458	445	443	417
Clothing Manufacturing	2,938	2,556	2,395	1,965	1,673	1,340	1,043	808	826	831	668
Leather and Allied Product Manufacturing	291	230	254	238	225	204	167	172	167	175	184
Wood Product Manufacturing	16,329	17,059	21,360	19,558	16,773	15,088	9,475	7,122	8,259	8,401	9,346
Paper Manufacturing	20,752	21,660	22,404	21,460	20,548	19,764	19,672	15,686	16,730	16,910	15,331
Printing and Related Support Activities	1,987	1,735	1,590	1,608	1,464	1,374	1,208	976	951	972	885
Petroleum and Coal Products Manufacturing	9,140	10,560	12,257	14,950	15,321	16,489	22,395	15,248	19,746	22,021	24,132
Chemical Manufacturing	19,483	19,530	23,321	25,774	27,570	30,191	30,917	25,332	28,417	28,218	28,262
Plastics and Rubber Products Manufacturing	12,088	11,702	12,091	12,340	11,974	11,255	10,247	8,818	9,469	10,039	10,453
Non-Metallic Mineral Product Manufacturing	2,859	2,941	2,984	2,599	2,454	2,487	2,391	1,730	1,868	1,833	1,714
Primary Metal Manufacturing	19,468	19,314	23,167	24,858	22,397	20,734	26,582	21,470	28,158	31,887	28,047
Fabricated Metal Product Manufacturing	6,397	7,071	7,973	8,178	8,783	8,429	8,107	6,308	6,984	6,891	6,609
Machinery Manufacturing	20,398	19,536	19,845	20,671	21,799	22,670	24,617	19,660	19,750	21,352	22,670
Computer and Electronic Product Manufacturing	19,079	14,132	15,017	16,888	16,122	15,086	14,725	11,881	10,581	10,119	10,044
Electrical Equipment, Appliance and Component Manufacturing	6,015	5,580	5,758	5,838	6,236	6,083	5,946	5,039	4,848	4,964	5,122
Transportation Equipment Manufacturing	99,513	89,694	93,040	90,997	89,780	82,012	66,443	51,318	62,378	64,030	73,424
Furniture and Related Product Manufacturing	7,389	6,648	6,743	6,404	5,884	5,183	4,401	3,010	3,239	3,335	3,440
Miscellaneous Manufacturing	3,165	3,032	3,208	3,010	2,880	2,956	3,072	3,883	4,083	4,710	4,048
Total	291,869	271,427	285,399	286,703	267,714	257,351	263,703	210,335	242,945	260,665	271,259

Source(s): Statistics Canada, International trade division.

Appendix 2

Text table 2

10 biggest importers of Canadian manufactured goods (millions of dollars)

Countries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
United States	256,941	235,030	252,647	253,972	246,443	237,746	222,164	169,510	198,783	201,265	212,132
Japan	5,503	5,390	5,667	5,454	5,465	5,059	4,939	3,905	4,379	4,557	4,376
United Kingdom	3,259	3,667	4,519	4,385	4,956	7,125	5,869	4,527	4,878	5,094	4,696
China	2,788	2,960	4,221	4,514	5,171	6,392	6,394	5,950	7,685	9,087	9,456
Germany	2,133	2,170	1,796	2,069	2,613	2,585	2,439	2,500	2,233	2,850	2,522
Mexico	1,824	1,810	2,166	2,488	3,241	3,404	3,662	2,856	3,158	3,394	3,410
France	1,612	1,623	1,889	1,986	2,199	2,536	2,958	1,971	1,998	2,341	2,520
South Korea	1,439	1,564	1,854	1,592	2,139	1,941	1,997	1,822	1,706	1,985	1,763
Netherlands	1,415	1,195	1,197	1,570	2,326	2,980	2,889	1,990	2,478	3,308	2,980
Italy	1,118	1,140	1,234	1,395	1,342	1,945	1,601	1,011	1,102	1,057	1,024

Source(s): Statistics Canada, International trade division.

Appendix 3

Text table 3
Manufacturing exports to the United States, by industry (millions of dollars)

Industries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Food Manufacturing	12,937	12,158	13,911	13,160	11,466	11,687	13,186	13,649	12,758	14,575	15,310
Beverage and Tobacco Product Manufacturing	1,397	1,315	1,243	1,054	1,037	935	873	778	794	827	889
Textile Mills	1,584	1,462	1,367	1,254	1,075	960	782	666	662	678	717
Textile Product Mills	819	684	710	670	601	597	474	400	386	401	377
Clothing Manufacturing	2,811	2,414	2,359	1,716	1,466	1,170	846	683	663	646	661
Leather and Allied Product Manufacturing	265	188	178	178	155	144	132	119	131	118	131
Wood Product Manufacturing	15,643	14,899	18,753	17,355	14,882	10,672	7,323	5,280	5,739	5,718	6,458
Paper Manufacturing	17,745	15,685	16,104	15,600	14,777	13,531	13,574	11,055	10,745	10,457	9,583
Printing and Related Support Activities	1,816	1,535	1,435	1,377	1,261	1,123	978	788	730	671	685
Petroleum and Coal Products Manufacturing	8,921	10,329	11,701	14,184	14,658	15,695	16,953	13,688	17,619	19,932	20,804
Chemical Manufacturing	16,536	16,232	16,868	20,469	21,868	22,584	23,641	19,292	20,102	22,497	21,716
Plastics and Rubber Products Manufacturing	11,639	11,172	11,389	11,699	11,172	10,409	9,439	8,228	8,571	9,382	9,788
Non-Metallic Mineral Product Manufacturing	2,723	2,485	2,485	2,382	2,408	2,242	2,039	1,552	1,428	1,456	1,548
Primary Metal Manufacturing	15,632	14,087	17,353	18,982	23,834	24,937	25,135	15,319	19,420	21,617	20,309
Fabricated Metal Product Manufacturing	7,980	6,794	7,059	7,198	7,368	7,112	6,986	6,046	6,705	6,938	6,980
Machinery Manufacturing	16,915	14,643	15,309	15,799	15,799	15,846	16,011	12,732	12,575	14,280	15,075
Computer and Electronic Product Manufacturing	12,721	10,192	10,915	11,845	10,446	10,101	10,076	7,775	6,527	6,307	6,412
Electrical Equipment, Appliance and Component Manufacturing	5,372	4,858	4,802	4,952	5,137	4,966	4,756	4,039	3,859	3,837	3,836
Transportation Equipment Manufacturing	84,469	85,464	86,689	86,349	79,408	75,781	59,686	64,419	56,364	57,645	66,463
Furniture and Related Product Manufacturing	7,035	6,419	6,595	6,145	5,718	4,918	4,102	2,775	2,884	3,112	3,211
Miscellaneous Manufacturing	2,661	2,478	2,527	2,349	2,309	2,197	2,681	2,674	2,833	3,325	2,856
Total	256,841	255,039	262,647	263,672	246,443	237,746	222,164	189,510	188,783	201,283	212,132

Source(s): Statistics Canada, International trade division.

Appendix 4

Text table 4
Manufacturing exports to China, by industry (thousands of dollars)

Industries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Food Manufacturing	333,373	435,832	498,567	569,251	477,317	604,311	653,758	744,367	1,572,003	1,502,071	2,112,305
Beverage and Tobacco Product Manufacturing	16,077	14,338	21,382	19,708	14,680	12,025	5,077	5,746	10,298	11,731	30,124
Textile Mills	5,081	9,421	13,949	8,661	12,882	14,330	15,357	20,525	14,172	10,273	11,540
Textile Product Mills	128	994	2,960	1,838	3,397	2,106	2,398	1,569	1,934	1,688	1,431
Clothing Manufacturing	2,133	990	999	2,013	2,747	2,286	1,980	2,112	3,046	3,522	4,091
Leather and Allied Product Manufacturing	1,573	1,736	3,998	1,199	1,740	2,660	1,919	13,502	1,918	2,064	3,953
Wood Product Manufacturing	51,539	72,286	92,557	96,417	107,213	153,596	210,716	342,757	713,082	1,143,280	1,113,346
Paper Manufacturing	704,579	824,059	1,026,636	955,887	1,088,370	1,454,370	1,396,011	1,351,805	2,031,397	2,501,512	2,591,745
Printing and Related Support Activities	605	2,931	2,463	4,731	3,831	4,239	3,565	1,885	1,707	1,838	1,370
Petroleum and Coal Products Manufacturing	3,069	3,166	2,873	4,992	16,960	9,684	25,463	38,560	88,423	80,945	115,972
Chemical Manufacturing	680,044	814,154	1,156,568	1,302,882	1,327,689	1,524,365	1,536,411	833,708	851,277	1,078,077	1,100,200
Plastics and Rubber Products Manufacturing	31,485	49,393	42,131	37,804	65,199	63,829	47,092	41,676	42,842	50,215	47,945
Non-Metallic Mineral Product Manufacturing	4,695	5,325	8,126	5,038	7,291	9,225	13,221	16,410	22,652	19,155	23,562
Primary Metal Manufacturing	82,693	153,440	369,469	503,116	878,632	1,263,816	1,138,439	970,464	1,010,289	940,682	626,289
Fabricated Metal Product Manufacturing	30,686	34,710	43,474	75,173	82,353	85,808	77,391	86,227	84,463	93,722	114,166
Machinery Manufacturing	140,930	229,253	283,402	376,637	427,172	471,608	501,484	780,738	568,530	626,214	767,756
Computer and Electronic Product Manufacturing	230,804	256,769	279,469	318,769	349,557	303,317	335,572	398,868	345,673	342,531	367,156
Electrical Equipment, Appliance and Component Manufacturing	38,527	83,021	78,511	85,628	122,291	127,508	134,954	113,444	97,999	101,966	83,852
Transportation Equipment Manufacturing	325,816	140,416	94,889	101,938	133,859	139,983	89,634	54,989	150,863	334,807	335,359
Furniture and Related Product Manufacturing	19,110	20,350	13,822	9,148	8,996	8,934	8,694	9,160	14,047	14,214	15,231
Miscellaneous Manufacturing	11,566	16,397	12,479	19,652	11,654	14,842	20,032	21,526	29,008	25,440	30,643
Total	2,706,396	2,960,204	4,220,573	4,513,516	5,170,837	6,282,022	6,263,660	5,650,169	7,665,082	9,099,199	9,466,079

Source(s): Statistics Canada, International trade division.

Appendix 5

Text table 5
Manufacturing exports to European Union countries, by industry (millions of dollars)

Industries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Food Manufacturing	623	711	739	836	1,122	962	834	686	722	865	791
Beverage and Tobacco Product Manufacturing	51	60	48	48	50	42	25	26	19	27	30
Textile Mills	28	31	35	50	28	31	29	21	25	18	17
Textile Product Mills	18	25	26	29	26	33	26	24	22	17	10
Clothing Manufacturing	94	90	123	113	111	105	86	66	108	104	117
Leather and Allied Product Manufacturing	26	24	33	28	32	30	29	19	19	18	14
Wood Product Manufacturing	486	508	525	508	567	661	592	436	510	479	383
Paper Manufacturing	2,326	2,186	2,059	1,832	1,967	1,882	1,787	964	915	738	624
Printing and Related Support Activities	99	119	94	101	111	111	110	83	87	84	91
Petroleum and Coal Products Manufacturing	115	102	425	464	285	219	2,174	1,061	592	1,331	2,156
Chemical Manufacturing	946	1,193	1,266	1,830	2,093	3,581	2,643	2,563	2,481	2,712	2,472
Plastics and Rubber Products Manufacturing	169	196	275	258	275	262	258	198	207	201	180
Non-Metallic Mineral Product Manufacturing	72	83	100	103	109	134	123	87	91	80	65
Primary Metal Manufacturing	1,712	1,763	1,688	2,032	2,834	5,396	4,040	1,589	2,727	3,714	3,311
Fabricated Metal Product Manufacturing	339	340	333	306	365	421	497	462	413	424	406
Machinery Manufacturing	1,440	1,467	1,443	1,783	2,044	2,276	2,396	1,996	1,789	2,014	2,003
Computer and Electronic Product Manufacturing	1,466	1,777	2,172	2,385	2,689	2,735	1,980	1,510	1,574	1,421	1,311
Electrical Equipment, Appliance and Component Manufacturing	253	309	395	345	394	370	357	308	322	433	469
Transportation Equipment Manufacturing	2,518	2,104	1,974	1,883	3,084	2,937	3,091	3,561	3,352	2,742	2,588
Furniture and Related Product Manufacturing	87	85	82	79	77	75	66	52	57	53	50
Miscellaneous Manufacturing	231	264	362	371	357	427	460	662	718	703	632
Total	13,038	13,467	14,466	15,313	17,938	21,801	21,099	16,104	16,878	16,404	17,791

Source(s): Statistics Canada, International trade division.

Appendix 6

Text table 6
Manufacturers' sales, by industry, 2002-2012 (millions of dollars)

Industries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Food Manufacturing	64,080	67,085	67,785	67,194	71,714	71,660	76,608	80,267	82,556	85,523	87,316
Beverage and Tobacco Product Manufacturing	12,074	12,192	12,555	12,664	11,329	10,709	10,307	10,671	10,725	11,156	11,569
Textile Mills	4,391	3,836	3,660	3,359	2,913	2,586	1,827	1,618	1,553	1,629	1,597
Textile Product Mills	2,950	2,867	2,933	2,591	2,367	2,347	2,159	1,676	1,664	1,734	1,750
Clothing Manufacturing	8,024	7,864	8,241	9,186	4,555	3,810	2,646	2,267	2,467	2,673	3,529
Leather and Allied Product Manufacturing	956	850	840	910	454	466	427	381	418	400	409
Wood Product Manufacturing	32,802	32,360	35,793	34,131	30,970	24,806	21,522	16,780	18,488	18,480	20,350
Paper Manufacturing	34,284	33,359	33,710	32,508	30,645	29,435	28,637	24,875	25,207	25,885	24,162
Printing and Related Support Activities	12,155	12,436	11,536	11,934	11,288	10,343	10,283	9,275	9,008	8,906	9,074
Petroleum and Coal Products Manufacturing	33,697	37,585	45,730	57,036	61,467	66,871	82,491	59,209	68,053	79,334	65,251
Chemical Manufacturing	40,469	43,068	47,131	49,743	49,230	47,660	46,639	41,630	44,415	46,650	45,924
Plastics and Rubber Products Manufacturing	25,287	26,464	25,808	26,805	27,243	25,653	23,335	19,359	21,885	24,059	24,547
Non-Metallic Mineral Product Manufacturing	11,631	12,039	12,240	12,744	14,157	14,410	14,139	11,883	12,839	13,149	13,151
Primary Metal Manufacturing	36,075	36,916	42,512	42,986	46,834	51,259	53,841	33,789	42,188	46,036	46,319
Fabricated Metal Product Manufacturing	32,211	33,356	32,758	34,167	34,666	36,123	36,439	29,364	30,365	33,017	35,047
Machinery Manufacturing	27,448	28,070	27,749	30,080	31,359	32,104	32,298	27,195	28,094	33,379	35,256
Computer and Electronic Product Manufacturing	22,656	20,826	20,338	19,375	19,269	18,434	17,278	15,389	15,342	15,338	13,664
Electrical Equipment, Appliance and Component Manufacturing	10,136	9,482	9,453	9,804	10,482	10,780	10,467	9,376	9,585	10,131	10,351
Transportation Equipment Manufacturing	126,452	120,568	123,167	124,741	119,387	116,644	96,403	74,280	84,583	91,730	104,013
Furniture and Related Product Manufacturing	13,916	13,719	13,255	13,350	13,104	13,169	12,343	10,367	10,614	10,188	10,282
Miscellaneous Manufacturing	8,309	8,702	9,160	8,421	9,206	9,079	9,909	9,742	10,483	11,730	11,307
Total	569,909	583,604	602,580	599,206	595,527	597,673	591,970	489,178	531,393	573,918	586,660

Source(s): Statistics Canada, Manufacturing and energy division.

Appendix 7

Text table 7
Intensity of Exports ratio by industry, 2002-2012, in percentage

Industries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Food Manufacturing	26.2	24.7	26.8	26.3	23.4	23.9	25.2	22.7	23.9	25.9	26.7
Beverage and Tobacco Product Manufacturing	12.7	11.9	10.9	9.3	10.6	10.9	9.6	8.1	8.1	8.2	8.6
Textile Mills	40.1	42.6	41.4	42.3	47.6	52.3	47.2	47.3	50.2	46.2	50.1
Textile Product Mills	29.1	25.6	29.9	28.9	28.2	25.8	25.0	28.2	26.7	26.3	23.8
Clothing Manufacturing	36.6	32.4	38.2	37.6	36.7	37.1	38.3	36.6	33.1	31.1	33.9
Leather and Allied Product Manufacturing	26.9	25.8	39.1	46.2	51.4	43.7	43.8	45.0	40.2	43.8	44.9
Wood Product Manufacturing	55.9	52.7	59.7	57.3	54.2	52.4	44.0	42.4	44.8	45.5	45.9
Paper Manufacturing	69.3	64.9	66.5	66.0	67.1	67.2	69.7	63.1	63.9	65.0	63.5
Printing and Related Support Activities	16.3	14.0	13.8	13.5	13.1	13.3	11.7	10.1	10.3	9.8	9.5
Petroleum and Coal Products Manufacturing	27.1	28.2	26.8	26.2	24.9	24.8	27.0	25.8	27.5	27.8	28.3
Chemical Manufacturing	48.1	45.3	49.5	51.8	56.0	63.3	63.4	60.9	59.5	62.4	61.5
Plastics and Rubber Products Manufacturing	47.8	44.2	47.1	46.2	44.0	43.9	43.9	45.5	43.4	41.8	42.6
Non-Metallic Mineral Product Manufacturing	24.6	22.0	21.9	20.4	18.7	17.3	16.1	14.6	12.5	12.4	13.0
Primary Metal Manufacturing	54.0	49.6	54.5	57.9	65.0	75.5	67.9	63.6	66.7	65.4	62.7
Fabricated Metal Product Manufacturing	26.1	22.7	24.3	23.9	24.0	23.3	22.2	21.2	19.7	18.4	18.9
Machinery Manufacturing	74.3	66.0	71.5	69.8	69.4	70.6	76.3	72.6	66.8	64.0	64.9
Computer and Electronic Product Manufacturing	71.0	67.9	76.3	87.2	83.7	81.4	85.2	75.3	68.8	66.0	73.5
Electrical Equipment, Appliance and Component Manufacturing	59.3	58.0	61.3	60.2	59.4	56.5	56.7	53.7	50.7	49.0	49.5
Transportation Equipment Manufacturing	78.7	74.4	75.5	72.9	71.9	70.3	68.9	69.1	73.7	69.8	70.6
Furniture and Related Product Manufacturing	52.2	48.4	50.9	47.9	45.4	39.4	35.9	29.0	30.4	32.7	33.6
Miscellaneous Manufacturing	37.2	34.8	39.2	35.8	32.4	32.6	37.1	39.7	38.9	40.2	35.8
Total	52.1	48.2	50.7	49.9	49.2	49.8	47.9	44.6	45.7	45.4	45.7

Appendix 8

A new conversion

Data conversion is generally not used to conduct an economic analysis of this type. Furthermore, the database produced from the conventional conversion of the Harmonized System to NAICS may potentially have limitations that are hard to identify. Since no test has ever been done to check the robustness of this conversion, a new conversion will be explore, from the North American Product Classification System (NAPCS) to NAICS, and the results of the two converted data sets will be compare.

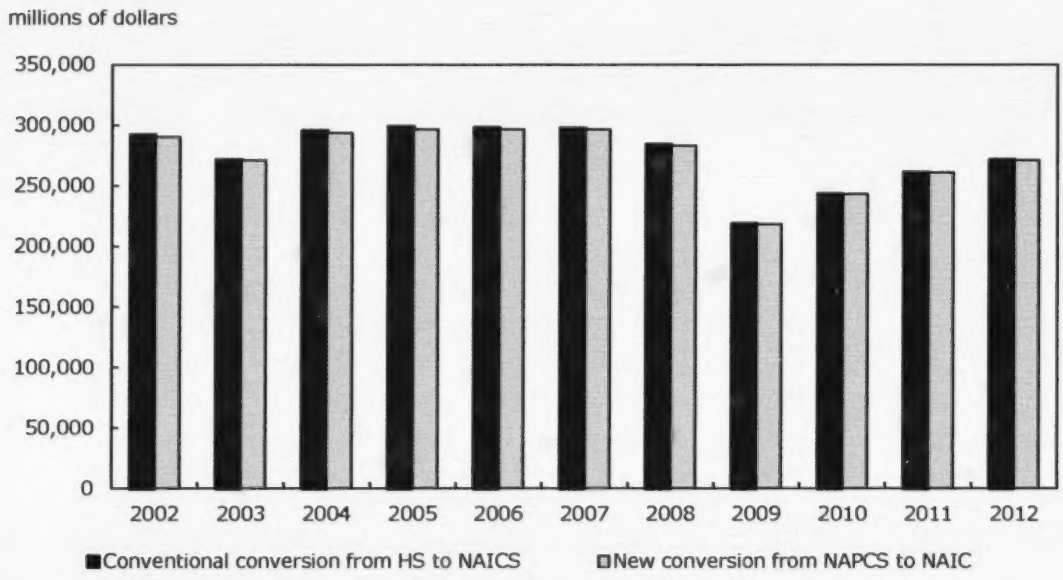
Trade data are coded according to a product classification system (Harmonized System or HS, and North American Product Classification System or NAPCS), while manufacturers' sales are coded according to an industry classification system (NAICS, manufacturing codes 31 to 33). Since the two classification systems are conceptually different, it is not easy to integrate these two data sets. The conventional conversion that was used for the economic analysis in this study is from HS codes to NAICS codes. However, few tests have ever been conducted to check the robustness of the data obtained from this conversion.[1] The concordance of the HS code to the NAICS system was carried out several years ago and was based on the principle of the "industry most likely to export this product". To verify the robustness of the results of this work based on the choice of a conversion method, we sought to compare the data produced by this method with those yielded by another method.

1. For example, this conversion is based on NAICS 1997, whereas the version now in force is NAICS 2012.

Since 2012, international trade data have been published using the NAPCS product classification system.[2,3] For our conversion, we took trade data from NAPCS and converted them into NAICS data. To make a link between the two classifications, we adapted another conversion that matches NAPCS classes with the Annual Survey of Manufactures (ASM) List of Goods of 2004.[4] This list of goods classifies both goods purchased and goods produced by Canadian manufacturers, and the first three digits of this classification correspond to the first three digits of the 21 manufacturing industries based on the NAICS code. In this classification, products are classified according to their industry of origin. This concordance therefore gave us a very good basis for generating our own conversion. Accordingly, we looked at the classes[5] of the NAPCS code on international trade from 2002 to 2012 and changed them into the three-digit numeric NAICS code, if these classes were of a manufacturing nature according to the ASM List of Goods.

The results of this new conversion generated data that were similar and comparable to those in the conventional conversion, across the 21 manufacturing industries and the 10 leading countries to which Canadian manufactured goods are exported, showing the robustness of both conversions. For example, between 2002 and 2012, the difference of the total between the two conversions was no more than 0.67%.[6] In cases where some industries yield results that are not perfectly aligned, the trends are nevertheless quite similar.[7] Chart 1 shows the totals of the two conversions side by side from 2002 to 2012.

Chart 1
Comparison of two data conversions



Source: Statistics Canada, International trade division.

2. International trade data are classified according to the Harmonized System and the NAPCS classification system. The HS code is the most detailed level of data on international trade. The NAPCS system provides a more aggregated hierarchical classification.
3. For more information on this classification system, see Statistics Canada, Notice of introduction of a new aggregation structure for the classification of imports and exports of goods, May 29, 2012. Available at the following link: *http://www.statcan.gc.ca/subjects-sujets/standard-norme/napcs-scpan/notice-avis/napcs-scpan-02-eng.htm#a2* (visited on October 11, 2013).
4. Statistics Canada, Annual Survey of Manufactures (ASM) 2004 – List of Goods, March 8, 2010. Available on line at *http://stds.statcan.gc.ca/asm-eam/intro-eng.asp* (web page visited on October 15, 2013).
5. We designate as "classes" the 4th level of precision of the NAPCS classification. In hierarchical order, this classification includes Sections (three-digit alphanumeric code), Divisions (four-digit alphanumeric code), Groups (three-digit numeric code) and Classes (five-digit numeric code).
6. For more information on the results of this new conversion, please contact the Energy and Manufacturing Division.
7. For example, the electrical equipment, appliance and component manufacturing industry shows a difference of levels between the two conversions of approximately 10%. However, the difference between years is largely the same.

Having obtained comparable results in the two cases, we believe that these two conversions yield similar results in this specific analytical framework, namely the analysis of domestic exports at the three-digit NAICS level. We cannot guarantee the quality of the results should this conversion be used for re-exports, for imports, for more specific NAICS levels (5-digit NAICS) or for provincial data, since we did not test these levels. We make the assumption that the more detailed the conversion, the less robust the results will be. Although not perfect, these conversions generate data that most closely approach the economic reality of the subject analyzed in this paper. Other studies could use this new conversion to do other tests and improve it. These data could also be compared with, or serve as a complement to, the databases generated by the register of exporters and importers[8] when it is updated.

8. The databases for the register of exporters and importers are lists of establishments that export or import merchandise. These databases are structured by type of industry, and they record the value of the merchandise that these establishments export or import. For more information, go to *http://www23.statcan.gc.ca/imdb/p2SV_f.pl?Function=getSurvey&SDDS=5124&lang=en&db=imdb&adm=8&dis=2#a3*.